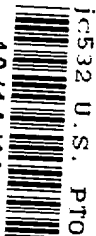


10/14/98



jc532 U.S. PTO

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PATENT APPLICATION
TRANSMITTAL**

(Only for new nonprovisional applications under 37 CFR 1.53(b))

Attorney Docket No. UF-206X Total Pages 13

First Named Inventor or Application Identifier

Eric Bryan Bish

Express Mail Label No. EE628026168US

APPLICATION ELEMENTS
See MPEP chapter 600 concerning utility patent application contents.ADDRESS TO: Assistant Commissioner for Patents
Box Patent Application
Washington, DC 20231

1. ☒ Fee Transmittal Form in triplicate
(Submit an original, and a duplicate for fee processing)
2. ☒ Specification [Total Pages 8]
(preferred arrangement set forth below)
- Descriptive title of the invention
 - Cross References to Related Applications
 - Statement Regarding Fed sponsored R & D
 - Reference to Microfiche Appendix
 - Background of the invention
 - Brief Summary of the invention
 - Brief Description of the Drawings (if filed)
 - Detailed Description
 - Claim(s)
 - Abstract of the Disclosure
3. ☐ Drawing(s) (35 USC 113) [Total Sheets]
4. Oath or Declaration [Total Pages 2]
- a. ☒ Newly executed (original or copy) unsigned
- b. ☐ Copy from a prior application (37 CFR 1.63(d))
(for continuation/divisional with Box 17 completed)
[Note Box 5 below]
- i. ☐ DELETION OF INVENTOR(S)
Signed statement attached deleting
inventor(s) named in the prior application,
see 37 CFR 1.63(d)(2) and 1.33(b).
5. ☐ Incorporation By Reference (useable if Box 4b is checked)
The entire disclosure of the prior application, from which a
copy of the oath or declaration is supplied under Box 4b,
is considered as being part of the disclosure of the
accompanying application and is hereby incorporated by
reference therein.

6. ☐ Microfiche Computer Program (Appendix)
7. Nucleotide and/or Amino Acid Sequence Submission
(if applicable, all necessary)
- a. ☐ Computer Readable Copy
- b. ☐ Paper Copy (identical to computer copy)
- c. ☐ Statement verifying identity of above copies

ACCOMPANYING APPLICATION PARTS

8. ☐ Assignment Papers (cover sheet & document(s))
9. ☐ 37 CFR 3.73(b) Statement ☐ Power of Attorney
(when there is an assignee)
10. ☐ English Translation Document (if applicable)
11. ☐ Information Disclosure Statement (IDS)/PTO-1449 ☐ Copies of IDS Citations
12. ☐ Preliminary Amendment
13. ☒ Return Receipt Postcard (MPEP 503)
(Should be specifically itemized)
14. ☒ Small Entity ☐ Statement filed in prior application,
Statement(s) ☐ Status still proper and desired
15. ☐ Certified Copy of Priority Document(s)
(if foreign priority is claimed)
16. ☒ Other: claims priority from...
S.N. 60/061,969

17. If a CONTINUING APPLICATION, check appropriate box and supply the requisite information:☐ Continuation ☐ Divisional ☐ Continuation-in-part (CIP) of prior application No: _____**18. CORRESPONDENCE ADDRESS**☐ Customer Number or Bar Code Labelor ☒ Correspondence address below

(Insert Customer No. or Attach bar code label here)

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	Saliwanchik, Lloyd & Saliwanchik				
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	2421 N.W. 41st Street, Suite A-1				
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Burden Hour Statement: This form is estimated to take 0.2 hours to complete. Time will vary depending upon the needs of the individual case. Any comments on the amount of time you are required to complete this form should be sent to the Chief Information Officer, Patent and Trademark Office, Washington, DC 20231. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Assistant Commissioner for Patents, Box Patent Application, Washington, DC 20231.

FEE TRANSMITTAL FORM

Assistant Commissioner for Patents
 Box Patent Application
 Washington, D.C. 20231

Sir:

Transmitted herewith for filing is the patent application of:

Inventor(s): Eric Bryan Bish, Daniel James Cantliffe, Craig Kellman Chandler


Entitled: Strawberry Transplant Conditioning For Flower Induction

- A Utility Patent Application Transmittal Form accompanies this Fee Transmittal Form.
- The filing fee is calculated below:

CLAIMS AS FILED					
	Number filed		Number Extra	Rate	Fee
Basic Fee					\$ 395.00
Total Claims	17	=	0	x \$11	\$ 0
Independent Claims	4	=	1	x \$41	\$ 41.00
Presentation of Multiple Dependent Claim(s) (\$165)					
Total Filing Fee					\$ 436.00

- Please charge \$436.00 to Deposit Account No. 19-0065. A duplicate copy of this sheet is enclosed.
- The Commissioner is hereby authorized to charge any additional filing fees which may be required, or credit any overpayment, to Deposit Account No. 19-0065. A duplicate copy of this sheet is enclosed.
- This application is being mailed by Express Mail under 37 CFR 1.10 and the required certificate appears below.

October 14, 1998
 Date

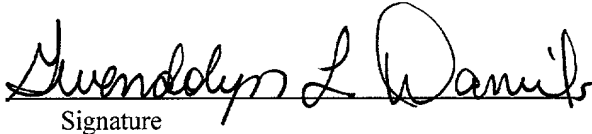

 Attorney of Record

CERTIFICATE OF MAILING BY EXPRESS MAIL (37 CFR 1.10)

Express Mail No. EE628026168US Date of Deposit: October 14, 1998

I hereby certify that this paper is being deposited with the United States Postal Service "Express Mail Post Office to Addressee" service under 37 CFR 1.10 on the date indicated above and is addressed to the Commissioner of Patents and Trademarks, Washington, D.C. 20231.

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 Signature

Applicant or Patentee: Eric B. Bish, Daniel J. Cantliffe, Craig K. Chandler Attorney's
Serial or Patent No.: _____ Docket No. UF-206X
Filed or Issued: _____
For: Strawberry Transplant Conditioning For Flower Induction

VERIFIED STATEMENT (DECLARATION) CLAIMING SMALL ENTITY
STATUS (37 CFR 1.9 (f) and 1.27 (c)) – NONPROFIT ORGANIZATION

I hereby declare that I am an official empowered to act on behalf of the nonprofit organization identified below:

NAME OF ORGANIZATION University of Florida
ADDRESS OF ORGANIZATION 223 Grinter Hall
Gainesville, FL 32611

TYPE OF ORGANIZATION

- ☒ UNIVERSITY OR OTHER INSTITUTION OF HIGHER EDUCATION
☐ TAX EXEMPT UNDER INTERNAL REVENUE SERVICE CODE (26 USC 501(a)(3))
☐ NONPROFIT SCIENTIFIC OR EDUCATIONAL UNDER STATUTE OF STATE OF THE UNITED STATES OF AMERICA
(NAME OF STATE _____)
(CITATION OF STATUTE _____)
☐ WOULD QUALIFY AS TAX EXEMPT UNDER INTERNAL REVENUE SERVICE CODE (26 USC 501(a) and 501(c)(3) IF LOCATED IN
THE UNITED STATES OF AMERICA
☐ WOULD QUALIFY AS NONPROFIT SCIENTIFIC OR EDUCATIONAL UNDER STATUTE OF STATE OF THE UNITED STATES OF
AMERICA IF LOCATED IN THE UNITED STATES OF AMERICA
(NAME OF STATE _____)
(CITATION OF STATUTE _____)

I hereby declare that the above identified nonprofit organization qualifies as a nonprofit organization as defined in 37 CFR 1.9 (d), for purposes of paying reduced fees under section 41(a) and (b) of Title 35, United States Code, with regard to the invention described in the above-identified:

☐ PATENT ☒ APPLICATION

I hereby declare that rights under contract or law have been conveyed to and remain with the nonprofit organization identified above with regard to the above-identified invention.

If the rights held by the above identified nonprofit organization are not exclusive, each individual, concern or organization having rights to the invention is listed below* and no rights to the invention are held by any person, other than the inventor, who could not qualify as a small business concern under 37 CFR 1.9 (d) or by any concern which would not qualify as a small business concern under 37 CFR 1.9 (d) or a nonprofit organization under 37 CFR 1.9 (e).

*NOTE: Separate verified statements are required from each named person, concern or organization having rights to the invention averring their status as small entities. (37 CFR 1.27)

NAME _____
ADDRESS _____
☐ INDIVIDUAL ☐ SMALL BUSINESS CONCERN ☐ NONPROFIT ORGANIZATION

NAME _____
ADDRESS _____
☐ INDIVIDUAL ☐ SMALL BUSINESS CONCERN ☐ NONPROFIT ORGANIZATION

I acknowledge the duty to file, in this application or patent, notification of any change of status resulting in loss of entitlement to small entity status prior to paying, or at the time of paying, the earliest of the issue fee or any maintenance fee due after the date on which status as a small entity is no longer appropriate. (37 CFR 1.28 (b))

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under section 1001 of Title 18 of the United States Code, and that such willful false statements may jeopardize the validity of the application, any patent issuing thereon, or any patent to which this verified statement is directed.

NAME OF PERSON SIGNING Ronald M. Kudla
TITLE IN ORGANIZATION Director
ADDRESS OF PERSON SIGNING 1938 West University Avenue
Gainesville, FL 32603

SIGNATURE Ronald M. Kudla DATE October 14, 1998

DESCRIPTIONSTRAWBERRY TRANSPLANT CONDITIONING
FOR FLOWER INDUCTION

5

Background of the Invention

Strawberries are an important and valuable crop throughout the world. Due to genetic heterozygosity, adaptability, and plasticity of the plant, this species can grow in varied environments throughout the world, from Alaska to South Africa (Martinelli, A. [1992] "Micropropagation of strawberry (*Fragaria* spp.)" In: *Biotechnology in Agriculture and Forestry* 18:354-370, Springer Verlag, Berlin, W. Germany). The high value of the fruit allows for intensive production methods in many regions.

Florida produced approximately 75 million kilograms of strawberries on 2,350 hectares in the 1993-94 season, an average yield of over 32,000 kg ha⁻¹ (Freie, R. and N. Pugh [1995] *Florida agricultural statistics: Vegetable Summary 1992-1993*, Florida Department of Agriculture and Consumer Services, Tallahassee, FL p. 47-48). Most of the crop is harvested between December and April with peak production occurring in mid-March. The average value of fruit ranged from greater than \$3.00 per kg in November/December declining through the season to less than \$1.00 per kg in March/April. However, only 10% of Florida's strawberry production occurs in November/December when the crop value is highest. Greater than 50% of Florida's production occurs in March/April when fruit value is below production costs (Smith, S. and T. Taylor [1993] "Production cost for selected vegetables in Florida, 1992-93," In: *University of Florida Circular* 1121, Gainesville, FL p.22).

Commercial strawberry cultivars must be vegetatively propagated because seeds are not true to type. This propagation has traditionally been done in field nurseries to produce a bare-root transplant. There are many problems associated with these bare-root transplants. However, containerized transplants also have drawbacks including being very vegetative and lacking early fruit production. Researchers have studied different methods for initiating early

flower development in containerized plants. For example, researchers have attempted to place containerized plants in large coolers (without light) to initiate flower buds, but this has not been successful.

Many environmental conditions have been shown to affect strawberry plant growth and development during propagation. See, for example Durner, E.F., E.B. Poling, and E.A. Albregts [1987] "Early season yield responses of selected strawberry cultivars to photoperiod and chilling in a Florida winter production system" *J. Amer. Soc. Hort. Sci.* 112:53-56; Maas, J.L. [1986] "Photoperiod and temperature effects on starch accumulation in strawberry roots" *Adv. Strawberry Prod.* 5:22-24; Long, J.H. [1935] "Seasonal changes in nitrogen and carbohydrate content of the strawberry plant" *Proc. Amer. Soc. Hort. Sci.* 33:386-388 as well as dormancy Bringhurst *et al.*, 1960; and Durner, E.F., J.A. Barden, D.G. Himelrick, and E.B. Poling [1984] "Photoperiod and temperature effects on flower and runner development in day-neutral, Junebearing, and Everbearing strawberries" *J. Amer. Soc. Hort. Sci.* 109:396-400.

Brief Summary of the Invention

The subject invention concerns methods for enhancing flower induction in strawberry plants. More specifically, one embodiment of the subject invention provides a method for inducing flowering in strawberry plants by reducing the daytime temperature of the strawberry plants. In a preferred embodiment of the subject invention the daytime temperature may be reduced from about 30°C to about 20°C in order to induce flowering.

In a further embodiment of the subject invention, enhanced flower induction can be obtained according to the subject invention by reducing the amount of daylight (photoperiod) to which the strawberry plant is exposed. For example, if the photoperiod in a particular area is about 12 hours, then this can be reduced to a period of time, such as 6-10 hours, sufficient to enhance flower induction. In using this means to enhance flower induction, it is not necessary to reduce the temperature. Alternatively, with the reduced photoperiod the temperature may be reduced to a lesser extent than when a full photoperiod is used.

The optimal photoperiod and temperature can be readily determined by a person skilled in the art, having the benefit of the instant disclosure, for a particular strawberry plant species in a particular location.

5

Detailed Disclosure of the Invention

Advantageously, the method of the subject invention can be used to provide increased production of strawberries at the desirable peak period of the year by inducing flowering of the strawberry plant. This artificially controlled means of enhancing the flowering of the strawberry plant, advantageously, allows for increased strawberry production during the peak demand periods of the year.

10

In one embodiment of the subject invention, the daylight temperature of the strawberry plant is reduced to enhance the induction of flowering in the strawberry plant. The degrees and time adjustment can be readily determined by the strawberry plant grower for the various strawberry species grown. Containerized strawberry plants can either be subjected to artificially cooling the air or growing the plants at geographic locations in which the air temperature is conducive to flower initiation.

15

Alternatively, reducing the exposure time of the strawberry plant to daylight also can be done. Further, a combination of these means can be used to enhance flower induction.

20

In accordance with the subject invention, strawberry transplants can be grown at high temperatures (not conducive to flower formation) for approximately six to ten weeks. These plants can then be subjected to lower temperatures for flower initiation. Temperature and duration is dependent on variety and can be determined by the skilled artisan having the benefit of the instant disclosure. If flowers are formed early in transplant development they may interfere with transplant establishment. Containerized transplants conditioned for flower initiation can produce large quantities of high quality fruit. Early production attains a premium value and therefore justifies additional expense for conditioning plants.

25

In a preferred embodiment of the subject invention, strawberry plants are induced to flower by reducing the daytime temperature abruptly after a period of growth at temperatures which are sufficiently high such that flowering is not promoted. For example, strawberry

plants may be grown for a period of several weeks at about 30°C or higher after which time the daytime temperature can be reduced to 25°C or lower. Preferably, the daytime temperature is reduced to about 15 to 20°C. The nighttime temperature may be maintained at about 30°C or higher, or the nighttime temperature may also be reduced.

5 In a further embodiment of the subject invention, strawberry plants can be induced to flower by reducing the photoperiod to which the plants are exposed. Preferably, the reduction in photoperiod can be done abruptly. Thus, for example, plants which have been exposed to a photoperiod of 12 hours may have this photoperiod reduced to about 6-10 hours.

10 Both the reduction in photoperiod and the reduction in daytime temperature are preferably carried out in a controlled fashion such as in a greenhouse.

The subject invention also concerns a strawberry plant having enhanced flower induction produced by any of the methods, or combination thereof, described herein.

15 Following is an example which illustrates procedures for practicing the invention. This example should not be construed as limiting.

Example 1 — Early induction of flowering by cold daytime treatment

20 Plug transplants were grown at four temperature regimes (20/30, 20/20, 30/30, 30/20°C day/night) prior to transplanting. Plug transplants grown at 20°C in the day flowered earlier than transplants grown at 30°C daytime temperature.

25 It should be understood that the example and embodiments described herein are for illustrative purposes only and that various modifications or changes in light thereof will be suggested to persons skilled in the art and are to be included within the spirit and purview of this application.

Claims

1 1. A method for enhancing flower induction in a strawberry plant, said method
2 comprising reducing the daytime temperature to which said strawberry plant is exposed by
3 an effective amount sufficient to enhance flower induction in said strawberry plant.

1 2. The method according to claim 1, wherein the daytime temperature to which said
2 strawberry plant is exposed to is reduced from about 30°C or higher to about 25°C or lower.

1 3. The method according to claim 1, wherein the daytime temperature to which said
2 strawberry plant is exposed is reduced from about 30°C or higher to about 15 to 20°C.

1 4. The method according to claim 1, wherein the nighttime temperature to which
2 said strawberry plant is exposed to is maintained at about 30°C or higher.

1 5. The method according to claim 1, wherein daytime temperature is reduced by a
2 means selected from the group consisting of artificially cooling the air and changing the
3 geographic location of said strawberry plant.

1 6. A method for enhancing flower induction in a strawberry plant, said method
2 comprising reducing the duration of the photoperiod to which said strawberry plant is
3 exposed by an effective amount sufficient to enhance flower induction in said strawberry
4 plant.

1 7. The method according to claim 6, wherein the duration of the photoperiod is
2 reduced by about fifty percent.

1 8. The method according to claim 6, wherein the duration of the photoperiod is
2 reduced to a photoperiod of about six to ten hours.

1 9. The method according to claim 6, wherein the duration of the photoperiod is
2 reduced by a means selected from the group consisting of artificially controlling the duration
3 of the photoperiod and changing the geographic location of said strawberry plant.

1 10. A method for enhancing flower induction in a strawberry plant, said method
2 comprising:

3 a) reducing the daytime temperature to which strawberry plant is exposed; and

4 b) reducing the duration of the photoperiod to which said strawberry plant is
5 exposed,

6 wherein the daytime temperature and duration of the photoperiod are reduced by an effective
7 amount sufficient to enhance flower induction in said strawberry plant.

1 11. The method according to claim 10, wherein the daytime temperature to which
2 said strawberry plant is exposed to is reduced from about 30°C or higher to about 25°C or
3 lower.

1 12. The method according to claim 10, wherein the daytime temperature to which
2 said strawberry plant is exposed is reduced from about 30°C or higher to about 15 to 20°C.

1 13. The method according to claim 10, wherein the nighttime temperature to which
2 said strawberry plant is exposed to is maintained at about 30°C or higher.

1 14. The method according to claim 10, wherein the duration of the photoperiod is
2 reduced by about fifty percent.

1 15. The method according to claim 10, wherein the duration of the photoperiod is
2 reduced to a photoperiod of about six to ten hours.

1 16. The method according to claim 10, wherein the duration of the photoperiod is
2 reduced by a means selected from the group consisting of artificially controlling the duration
3 of the photoperiod and changing the geographic location of said strawberry plant.

1 17. A strawberry plant having enhanced flower induction produced by a method
2 selected from the group consisting of:

3 a) reducing the daytime temperature to which said strawberry plant is exposed by
4 an effective amount sufficient to enhance flower induction in said strawberry plant;

5 b) reducing the duration of the photoperiod to which said strawberry plant is exposed
6 by an effective amount sufficient to enhance flower induction in said strawberry plant; and

7 c) a combination of the methods in a) and b).

DECLARATION (37 CFR 1.63) AND POWER OF ATTORNEY

As a below-named inventor, I hereby declare that:

My residence, post office address, and citizenship are as stated below next to my name; and

I believe that I am the original, first, and sole inventor (if only one name is listed below), or an original, first, and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled **Strawberry Transplant Conditioning For Flower Induction**, specification for which

☐ is attached hereto.

☐ was filed _____, Serial No. _____.

I hereby state that I have reviewed and understand the contents of the above-identified specification, including the claims, as amended by any amendment referred to above.

I acknowledge the duty to disclose information which is material to the examination of this application in accordance with Title 37, Code of Federal Regulations, §1.56(a).

I hereby claim foreign priority benefits under Title 35, United States Code §119 and/or §365 of any foreign application(s) for patent or inventor's certificate listed below and have also identified any foreign application for patent or inventor's certificate having a filing date before that of the application on which priority is claimed:

Application Serial No.	Country	Filing Date	Priority Claimed
---------------------------	---------	-------------	------------------

I hereby claim priority benefits under Title 35, United States Code §119 of any provisional application(s) for patent listed below:

Application Serial No.	Filing Date	Priority Claimed
60/061,969	October 14, 1997	Yes

I hereby claim the benefit under Title 35, United States Code, §120 and/or §365 of any United States application(s) listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States application(s) in the manner provided by the first paragraph of Title 35, United States Code, §112, I acknowledge the duty to disclose material information as defined in Title 37, Code of Federal Regulations, §1.56(a) which became available between the filing date of the prior application and the national or PCT international filing date of this application:

Application Serial No.	Filing Date	Status (Patented, Pending, Abandoned)
---------------------------	-------------	--

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code, and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

I hereby appoint the following persons registered to practice before the Patent and Trademark Office as my attorneys with full power of substitution and revocation to prosecute this application and all divisions and continuations thereof and to transact all business in the Patent and Trademark Office connected therewith: Roman Saliwanchik, Reg. No. 21,023; David R. Saliwanchik, Reg. No. 31,794; Jeff Lloyd, Reg. No. 35,589; Doran R. Pace, Reg. No. 38,261; Christine Q. McLeod, Reg. No. 36,213; Jay M. Sanders, Reg. No. 39,355; James S. Parker, Reg. No. 40,119; Jean Kyle, Reg. No. 36,987; Timothy H. Van Dyke, Reg. No. 43,218.

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352-375-8100

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Date _____

Signature of First or Sole Inventor

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Date _____

Signature of Second Joint Inventor

Name of Third Joint Inventor Craig Kellman Chandler

Residence Tampa, FL Citizenship United States

Post Office Address 9306 Alanbrooke Street
Tampa, FL 33637 U.S.A.

Date _____

Signature of Third Joint Inventor

Name of Fourth Joint Inventor _____

Residence _____ Citizenship _____

Post Office Address _____

Date _____

Signature of Fourth Joint Inventor

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